FISH PHYSIOLOGY TASKS

FISH PHYSIOLOGY TOTAL COST ESTIMATE: $615,000

TASK #	FOUNDATION HYPOTHESIS	SUBHYPOTHESIS	INFORMATION/MODELING NEEDS	SUBTASKS	PRIORITY	ESTIMATED COST	RATIONALE	ASSUMPTIONS
FP1-1	Recommended (and delivered) flows meet temperature targets as specified in TRFE (e.g. smoltification at Weitchpec).		Determine if temperature targets are met with specified flow regimes	Continue monitoring water temperature at formerly specified locations for temperature model (SNTEMP) and use for validation testing in the existing model. Monitor hourly temperatures at specified locations (Stowaways + USBR stations)	**High**	**$15,000**	Basic compliance monitoring	Based on P. Zedonis. Same group should do both FP1-1 and FP1-2
FP1-2				Confirm the existing temperature model (SNTEMP)	**High**	**$15,000**	To ensure that model is predicting accurately	Same group should do both FP1-1 and FP1-2
FP2-1	Temperature targets specified in TRFE/ROD are appropriate for each species/lifestage. Specifically, to reduce uncertainty, perform lab study to evaluate/confirm smoltification requirements of all 3 species of salmonid smolts.		Trinity River specific salmonid thermal physiological response characterization	Conduct laboratory studies to measure physiological response (e.g. energetics) and performance (e.g. ability to hypoosmoregulate) of steelhead, coho salmon, and chinook salmon SMOLTS exposed to a range of thermal conditions during smoltification. Exposure temperatures to include the thermal targets recommended in TRFE as well as temperatures above and below the recommendations.	**High**	**$100,000**	Evaluation to confirm the thermal recommendations, as most were literature derived from places other than the Trinity River.	To ensure that recommended temperatures are appropriate for Trinity River salmonids
FP2-2				Incorporate results into SALMOD production model for each species.	**High**	**$0**	To improve predicted benefit of action to smolt production from Trinity River	Workshop expenses for comprehensive review of SALMOD and applicability to various projects is included in Fish Habitat Section.
FP3-1	Mainstem spring thermal regime achieved by TRFE flow regimes will improve juvenile salmonid growth compared to "baseline" conditions. Growth achieved when optimal targets are met is measurably better than growth achieved during years when marginal targets are met.		a) Timing of peak fry emergence and size of emergents. 'b) Length/weight of outmigrants. 'c) Spring growth of resident coho, steelhead, chinook, parr.	Establish timing of fry emergence (coho, chinook, steelhead) at longitudinal sites (thermally variable) in the Trinity River and measure growth of age-0 fish throughout the year. Establish relative density estimates of age-0 throughout the river for development of hypotheses about important areas/reaches of growth and production, coordinate wtih emigration trap in mainstem near Junction City or North Fork.	**High**	**$80,000**	Timing of emergence is an important variable in a production model and is likely to vary between reaches of the Trinity River. Relative density estimates are important for determining areas of high production as well as any follow-up mortality estimates, to establish cause and effect of fry/juvenile growth rates with temperature/habitat, to help evaluate benefits of improved growth rates on smolt survival.	Companion project would be outmigrant monitoring - otherwise, cost goes up greatly. Workshop expenses for comprehensive review of SALMOD and applicability to various projects is included in Fish Habitat Section. Assume grad student assistance. This monitoring targets Age 0 fish, FP8-1 targets Age 1 and 2 fish, same monitoring organization should do Task FP3-1 and FP8-1.
FP3-2				Incorporate results into SALMOD production model for each species.	**High**	**$0**	To improve predicted benefit of action to smolt production from Trinity River	Includes incorporation of bioenergetics study results into salmod. Workshop expenses for comprehensive review of SALMOD and applicability to various projects is included in Fish Habitat Section.
FP4-1	Thermal regime resulting from TRFE flows extend the temporal duration and spatial extent of successful smoltification, resulting in higher smolt survival and adult returns.		a) Abundance and timing of smolts measured and marked at Weitchpec (NOTE: Significant improvement needed in the approach used to monitor and estimate abundance of emigrating smolts.) b) Escapement estimate of individually marked fish.	Emigration monitoring in the lower Trinity River. Mark - recapture for quantifiable estimation.	**High**	**$0**	Documentation of timing and number of smolt outmigration is important in measuring program success.	Companion projects would be outmigrant monitoring or estuary smolt sampling and returning adult surveys, cost included in FH4-3
FP4-2			(M)-Use results to improve the SALMOD production models. c) Development of a "healthy smolt metric or index" would be tremendously useful in determining the quality (likelihood of return) of emigrating smolts.	Incorporate results into SALMOD production model for each species.	**High**	**$0**	To improve predicted benefit of action to smolt production from Trinity River	Examination of adult scales etc. to determine high return rates - linkage of this to smolt production. Workshop expenses for comprehensive review of SALMOD and applicability to various projects is included in Fish Habitat Section.
FP5-1	In a critically dry year the recommended thermal regime meets smoltification requirements for all three species.		(I)- "Healthy Smolt Index", document health and water temperatures at Weitchpec and other specified locations along the river	Develop a "healthy smolt index" based on literature review and evaluation of Trinity River smolts. Evaluate smolt health during a critically dry year using measures of "smoltability" and general length-weight information collected from the emigrants (steelhead, coho and chinook salmon).	**High**	**$100,000**	Establishment of a baseline smolt health indicator will allow comparison between smolts emigrating from the Trinity River and the Klamath River. Additionally, smolt health may be variable in different water year types and this would be important to establish for further hypothesis testing and evaluation of the potential production of smolts from the river, able to test in FY2002 critically dry year	Should incorporate grad student research to developing the smolt health index
FP6-1	Temperature targets provide for thermal needs of holding, spawning, and incubating eggs for spring Chinook salmon in all water year types.		Trinity River specific salmonid thermal physiological response characterization	Laboratory measure of physiological response of Trinity River origin spring chinook ADULTS to range of thermal conditions that include both above and below existing temperature targets.	**Medium**	**$70,000**	To ensure that recommended temperatures are appropriate for Trinity River Spring Run Chinook adults and incubating eggs	Addresses whether temperatures derived from the 450 cfs flows are adequate for spring-run adult holding (and egg viability in adults), and whether the 300 cfs flows beginning in october are adequate for egg incubation after spring run spawning
FP7-1	Reduced travel time (associated with high flow rates) results in higher smolt survival.		Transit times of various emigrating species/sizes	Mark fish upriver for capture in lower river traps by using a statistically rigorous design to estimate the transit times of emigrating smolts by marking fish in multiple locations upstream of the screw traps and documenting their recapture in the traps.	**Medium**	**$20,000**	Compare transit time and survival of emigrating fish in Critically Dry flow regime to other regimes.	Coordinated with outmigrant monitoring
FP8-1	Target thermal regime during the summer supports increase growth for parr (e.g. thermal habitat is increased for salmonid parr with 450 cfs).		(M)- production models to predict the increased growth to test with observations in the field.	Measure absolute growth of uniquely marked parr (pit-tagged) for predicting 1+ and 2+ growth rates in production models.	**Medium**	**$125,000**	Increased growth of parr should be an indicator of improved channel conditions (more food, less energy expended), but growth will inherently vary between water year types. The level of growth variability is important to establish for production models and for evaluating implications of using water year type for management.	To ensure that recommended temperatures are appropriate for Trinity River salmonids, coordinated with outmigrant monitoring. This monitoring targets Age 1 and 2 fish, FP3-1 targets Age 0 fish, the same monitoring organization should do Task FP3-1 and FP8-1.
FP9-1	Current temperature targets in the Trinity River will have no deleterious effects (residualization, mortality) on smolts/adults migrating to or from or the Trinity River.		(I) "Healthy Smolt Index"	Workshop of participants at end of year to synthesize of several of the above projects investigating temperature, growth, mortality	**Medium**	**$25,000**	Synthesis of several of the above projects.	Companion with FP1-1
FP10-1	Altered channel form (point bars, decreased bank slopes, etc.) provide greater thermal diversity for juvenile salmonid rearing habitat.		(I)-a) Information needed on emergence and fry growth. 'b) need to monitor water temperature diversity in complex channel morphology, c) measures of thermal diversity between a control site and a desired habitat feature.	Microhabitat temperature investigation in simplified (riparian berm) and complex (alluvial) channel reaches (Stowaways).	**Medium**	**$15,000**	Thermal diversity may be important factor in habitat diversity for growth of fish and amphibians	